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HEAT-INSULATING CONTAINER

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the priority benefit of Japanese application serial no. 2002-266786, filed on September 12, 2002.

BACKGROUND OF THE INVENTION

1. Field of the Invention:

[0001] The present invention generally relates to a heat-insulating container applied in a freezer/refrigerator, cooler box, vacuum bottle, a heat-insulation lunch box or the like. More specifically, relates to a double-walled heat-insulating container comprising an inner vessel and an outer vessel, wherein a heat-insulating layer is formed between the inner vessel and the outer vessel.

2. Description of the Related Art:

[0002] A heat-insulating container such as a cooler box has an outer vessel and an inner vessel made of a synthetic resin. In the double-walled container, a gap exists between the inner vessel and the outer vessel. A bag having a barrier property is filled with a gas (hereinafter, low heat-conductivity gas) whose heat conductivity is lower than air, such as krypton, xenon, argon, or a mixing gas thereof, and the bag is inserted into the gap (referring to Japan Patent No. 2989447).

[0003] Although the bag of the conventional heat-insulating container can be filled with a predetermined amount of low heat-conductivity gas, the thickness of the central portion of the bag is larger than that of the edge portion. When inserting the bag into the gap between the inner vessel and the outer vessel, the central portion of the bag rubs against the sidewalls of the inner vessel and the outer vessel. The bag may not be properly inserted into the gap up to the depth end of the gap. If the bag filled with the low heat-conductivity gas is not properly inserted into the gap, a partial heat-insulating layer cannot be formed between the inner and the outer vessels of the heat-insulating container, and the heat-insulating performance will be adversely affected.

[0004] When the inner and outer vessels are integrally jointed by welding, it is difficult to maintain a uniform gap width. In a case when the bag is inserted into a gap that is wider than a predetermined value, some unwanted space is created between the inner and outer vessels, and the part with the larger gap may cause the heat-insulating performance become low. On the other hand, in a case when the bag is inserted into a gap narrower than a predetermined value, this may cause the problems such as application of excessive force resulting in wrinkling and bending of the bag that would otherwise generate pinholes in the bag can be avoided. Thus, the low heat-conductivity gas leaks as time goes by, and the heat-insulating performance is lowered gradually.

[0005] Particularly, if there exists a thickness difference between the central portion and the edge portion of the bag, the heat-insulating container becomes a polygonal shape, for example, a box of rectangular solid shape. The edge portion that is thinner than the central portion of the bag is arranged at the corner of the polygonal solid heat-insulating

container. No heat-insulating member can be arranged at the corner, and the bag is not in contact with the inner wall of the heat-insulating container. Then, an air layer is created between the bag and the inner wall at the corner of the heat-insulating container, and the heat-insulating performance is lowered which is not preferable.

[0006] In order to prevent the lowering of the heat-insulating performance, the Japanese Patent No. 2989447 discloses arranging a heat-insulating material at the corner of the heat-insulating container. However, the shape of the heat-insulating material is fixed such that when an insulating material in addition to the bag are inserted into the gap of the heat-insulating container, an excessive force is exerted on the bag. Thus, the bag is easily damaged.

SUMMARY OF THE INVENTION

[0007] The present invention is provided to solve the aforementioned problems and it is an object of the present invention to provide a heat-insulating container featuring a long and stable heat-insulating performance without partially deteriorating heat-insulating performance.

[0008] The aforementioned problems are solved by providing a heat insulating container comprising: an inner vessel and an outer vessel, wherein the inner vessel is arranged in the outer vessel with a gap; at least a bag, arranged in the gap, wherein the gap is filled with a gas whose heat-conductivity is lower than that of air; and a

reinforcement member, made of a material whose rigidity is higher than that of a composition material of the bag, is arranged on at least one peripheral side of the bag.

[0009] According to one aspect of the present invention, the reinforcement member is arranged at two sides of the bag.

[0010] According to another aspect of the present invention, a protrusion or a cavity is formed in at least one of the inner vessel and the outer vessel, and a cavity or a protrusion corresponding to the protrusion or the cavity of the inner or outer vessels is formed on the reinforcement member. As the protrusion or the cavity of one of the inner or outer vessels engages with the corresponding cavity or the corresponding protrusion of the reinforcement member, the bag can be easily inserted into the gap.

[0011] According to still another aspect of the present invention, the inner vessel and the outer vessel are formed into polygonal shapes. Each of the bags is inserted into the gap corresponding to at least two adjacent sides of the polygons, and a cavity or a protrusion is formed on the reinforcement member arranged onto one of the bags, and a protrusion or a cavity corresponding to the cavity or the protrusion, is formed on the other reinforcement member arranged onto the other bag. As the cavity or the protrusion of one of the reinforcement member of one of the bags engages with the corresponding protrusion or the cavity of the reinforcement member of the other bag, the bags can be easily inserted into the gap.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention, the objects and features of the invention and further objects, features and advantages thereof will be better understood from the following description taken in connection with the following accompanying drawings.

[0013] Fig. 1 is a perspective view showing heat-insulating container according to one embodiment of the present invention.

[0014] Fig. 2 is a perspective view showing the first example of the reinforcement structure (formed with reinforcement members) of the bag.

[0015] Fig. 3 is a perspective view showing the structure of the reinforcement member.

[0016] Fig. 4 is a partial plane view of the reinforcement member of the first example.

[0017] Fig. 5 is a partial plane view of the reinforcement member of the second example.

[0018] Fig. 6 is a perspective view showing the second example of the reinforcement structure (formed with reinforcement members) of the bag.

[0019] Fig. 7 is a perspective view showing the third example of the reinforcement structure (formed with reinforcement members) of the bag.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0020] The present invention will be described in detail as follows.

[0021] A heat-insulating container according to one embodiment of the present invention is illustrated with reference to Figs. 1 through 5.

[0022] Fig. 1 is a perspective view showing a heat-insulating container according to one embodiment of the present invention.

[0023] In this embodiment, the heat-insulating container is a double-walled container in which an inner vessel 1 is arranged in the outer vessel 2 with a gap 3 therebetween, and a bag 4 is arranged in the gap 3.

[0024] The inner vessel 1 is made of a synthetic resin, such as ABS resin, and a metal such as stainless steel, and is shaped into a rectangular solid structure having an upper opening. The outer vessel 2 is made of a synthetic resin, such as ABS resin, and a metal such as stainless steel, and is shaped into a rectangular solid structure having an upper opening.

[0025] In this embodiment, a low heat-conductivity gas whose heat-conductivity is lower than air is filled in the heat-insulating container. The bag 4 is arranged over the gap between the whole surfaces of a sidewall 1a of the inner vessel 1 and a sidewall 2a of the outer vessel 2 facing to the inner vessel 1. In other words, four bags 4 are respectively arranged in the gap 3 between the four sidewalls 1a and four sidewalls 2a.

[0026] A sealing member (not shown) is formed on an opening surface of the gap formed between the inner vessel 1 and the outer vessel 2. It is preferable to arrange the bag filled with a low heat-conductivity gas in the gap at the bottom part of the heat-insulating container.

[0027] A cap capable of opening or closing the upper opening of the heat-insulating container can be properly arranged in the present invention. It is preferred that the cap comprising an upper plate and a lower plate, wherein a bag filled with a low heat-conductivity gas is arranged in the gap between the two plates or wherein a foaming heat-insulating material is arranged in the gap.

[0028] The bag 4 with a rectangular shape is formed by heat-sealing plates (made of soft material having a gas barrier property) at three sides of its periphery, such as a five –layer structured sheet made of polypropylene／nylon／polyethylene terephthalate ／aluminum／polyethylene wherein three peripheral sides are heat-sealed to form into a bag shape.

[0029] Among the five layers, the polypropylene layer maintains the strength of the bag 4; the nylon layer, polyethylene terephthalate and aluminum layers maintain the gas barrier property; and the polyethylene layer seals the heat.

[0030] Fig. 2 is a perspective view showing the first example of the reinforcement structure of the bag 4.

[0031] A reinforcement member 10 whose rigidity is higher than the composition material of the bag 4 is arranged on at least a peripheral part of the bag 4.

[0032] In this example, the reinforcement members 10 extend along two sides among the heat-sealed portions 4a forming three peripheral sides of the bag 4. The reinforcement members 10 are arranged at two sides of the bag 4, i.e. two sides that oppose each other among the heat-sealed portions 4a. Moreover, the reinforcement members 10 are arranged from the opening portion 5 of the heat-insulating container towards the bottom portion 6. Furthermore, the reinforcement member 10 is comprised of plates 11 with a rectangular shape wherein a hinge 11a is formed along the length of the reinforcement member 10, such that the reinforcement member 10 can be folded relative to the hinge 11a.

[0033] Cavities 10a formed into a continuous groove shape extend over the length of the reinforcement member 10, as shown in Fig. 3. A crossing portion 10c is formed in the cavity 10a at a predetermined position. Fig. 3 shows an example of the reinforcement member 10 wherein cavities 10a are formed. However, it is also possible to intermittently form a protrusion and to arrange a concave crossing portion along the length of the reinforcement member 10.

[0034] It is preferred that the reinforcement member 10 is made of a synthetic resin or a foaming material of a synthetic resin with a low heat-conductivity and a high mechanical strength, such as polypropylene and polyethylene. Because the reinforcement member 10 is made of the synthetic resin or the foaming material of which, the reinforcement member 10 itself has a heat-insulating property.

[0035] Fig. 4 is a partial plane view of the reinforcement member of the first example.

[0036] In this example, the bag 4 fixed by the reinforcement member 10 and the other bag 4 fixed by the reinforcement member 12 are respectively arranged in the gap 3 corresponding to the two adjacent surfaces among the surfaces constructing the inner vessel 1 and the outer vessel 2, as shown in Fig. 4.

[0037] A protrusion 2d is formed on an inner surface of the sidewall 2a at a place nearby the corner 2c of the outer vessel 2. The protrusion 2d extends from the opening portion 5 of the heat-insulating container towards the bottom portion 6. A cavity 10a provided at one side of the reinforcement member 10 is engaged with the protrusion 2d. Similarly, a protrusion 2e is formed on an inner surface of the sidewall 2b adjacent to the sidewall 2a. The protrusion 2e extends from the opening portion 5 of the heat-insulating container towards the bottom portion 6. A cavity 12a of the reinforcement member 12 is engaged with the protrusion 2e. The protrusions 2d and 2e are not necessarily formed in the same length as the cavities 10a and 12a, and can be intermittently formed on the inner surfaces of the sidewalls 2a and 2b to partially engage with the cavities 10a and 12a.

[0038] At the corner of the gap 3, one of the two cavities 10a in two surfaces of the reinforcement member 10 which is not engaged with the protrusion 2d is for engaging with the protrusion 12b of the reinforcement member 12.

[0039] Fig. 5 is a partial plane view of the reinforcement member of the second example.

[0040] In this example, the bag 4 fixed by the reinforcement member 13 and the other bag 4 fixed by the reinforcement member 14 are respectively arranged in the gap 3

corresponding to the two adjacent surfaces among the surfaces constructing the inner vessel 1 and the outer vessel 2, as shown in Fig. 5.

[0041] A protrusion 2f is formed on an inner surface of the sidewall 2a at a place nearby the corner 2c of the outer vessel 2. The protrusion 2f extends from the opening portion 5 of the heat-insulating container towards the bottom portion 6. A cavity 13a provided at one side of the reinforcement member 13 is engaged with the protrusion 2f. The protrusions 2f is not necessarily formed in the same length as the cavity 13a, and can be intermittently formed on the inner surfaces of the sidewalls 2a to partially engage with the cavity 13a.

[0042] At the corner of the gap 3, one of the two cavities 13a in two surfaces of the reinforcement member 13 which is not engaged with the protrusion 2f is for engaging with the reinforcement member 14.

[0043] Figs. 4 and 5 show examples that the protrusion for engaging with the cavity of the reinforcement member is formed on the inner surface of the sidewalls 2a, 2b. However, it is also possible to form a cavity for engaging with the protrusion of the reinforcement member on the inner surfaces of the sidewalls 2a, 2b from the opening portion 5 of the heat-insulating container towards the bottom portion 6.

[0044] Moreover, in the heat-insulating container according to the embodiment of the present invention, at a place nearby the corner 1b at the outer surface of the sidewall 1a, a cavity engaged with the protrusion of the reinforcement member or a protrusion engaged with the cavity of the reinforcement member can be formed from the opening portion 5 of the heat-insulating container towards the bottom portion 6.

[0045] Accordingly, a cavity or a protrusion is formed on at least one of the inner vessel 1 and outer vessel 2, and a protrusion or a cavity that corresponds to the cavity or the protrusion on the inner vessel 1 or the outer vessel 2 is formed on the reinforcement member. By engaging the protrusion at one side with the cavity at the other side, the bag 4 can be fixed by the reinforcement member. When inserting the bag 4 into the gap 3, the bag 4 can be guided by the protrusion or cavity facilitating the insertion into the gap 3 towards the bottom portion 6 through the opening portion 5 of the heat-insulating container, and properly arrange the bag 4 in a predetermined position in the gap 3 in a direction perpendicular to the bottom portion 6.

[0046] Because the crossing portion is arranged in the cavity of the reinforcement member, when inserting the bag 4 into the gap 3, the bag 4 is caught by the cavity or protrusion arranged in the inner vessel 1 or the outer vessel 2, and therefore the bag 4 can be properly arranged and fixed in a predetermined position in the gap 3.

[0047] In a case when the protrusion is intermittently arranged on the inner vessel 1, outer vessel 2 or the reinforcement member, because the contact area between the reinforcement member and the inner vessel 1 or the outer vessel 2 is small, the heat-dissipation due to heat conduction from the inner vessel 1 towards the outer vessel 2 through the reinforcement member can be lowered.

[0048] By arranging the bag 4 fixed by two reinforcement members to engage with the reinforcement members at the corner of the gap 3 corresponding to the two adjacent surfaces, the bag 4 can be properly positioned in the gap 3. Additionally, because the reinforcement member is made of the foaming material of the synthetic resin with a low

heat-conductivity, the heat-insulating performance at the corner of the gap 3 cannot be lowered.

[0049] A method for manufacturing a heat-insulating container according to one embodiment of the present invention will be describe with reference to Figs. 1 and 2.

[0050] THE MANUFACTURE OF THE BAG

First, a sheet made of a soft material with a gas barrier property is cut into predetermined dimensions and then folded. The folded sheet is heat-sealed except the non-sealing edge portion to form a half-finished body of the bag. Secondly, a tube is inserted into the non-sealed portion. The half-finished body of the bag is filled with a low heat-conductivity gas through the tube. After filling enough low heat-conductivity gas, the non-sealed portion is then heat-sealed to complete the bag 4.

[0051] THE ASSEMBLY OF THE HEAT-INSULATING CONTAINER

First, a plurality of through holes 4b is formed in the bag 4 in positions at two sides opposite to each other among the heat-sealed portions 4a. Secondly, after fitting the protrusions 11b of the plates 11 into the through holes 4b of the heat-sealed portions 4a, the plates 11 are folded relative to the hinge 11a. Two reinforcement members 10 respectively sandwich two opposite sides among the heat-sealed portions 4a, such that the reinforcement members 10 are fixed onto the bag 4. When the plate 11 is folded, the protrusions 11b are fit in the receiving portion 11c formed in the opposite surface. Therefore, two surfaces of the heat-sealed portions 4a are tightly connected with the plates 11, and the reinforcement members 10 are fixed onto the bag 4. Regarding the

other fixing method, the plates 11 and the heat-sealed portions 4a can be fixed to each other by using an adhesive or a tape. Secondly, the bag 4 fixed by the reinforcement member 10 is inserted into the gap 3 towards the bottom portion 6 through the opening portion 5, such that a cavity or protrusion formed on the reinforcement member along the length, engages with a protrusion or cavity formed in the sidewall 1a or sidewall 2a. Similarly, the other bag 4 fixed by the other reinforcement member 10 is inserted into the neighboring portion of the gap 3. At the corner of the gap 3, a cavity or protrusion in one of the reinforcement members 10 engages with a protrusion or a cavity of the other reinforcement members 10. Accordingly, a heat-insulating container wherein four bags are arranged in the gap 3 corresponding to the four sidewalls 1a and 2a is obtained.

[0052] As a result, in this heat-insulating container, by arranging the reinforcement members 10 at two opposite sides among the heat-sealed portions 4a of the bag 4, the problems such as the wrinkling or bending of the bag 4 can be prevented. Thus, the bag 4 can be inserted up to the depth end of the gap 3.

[0053] Moreover, because the protrusions 11b of the plates 11 fit in the through holes 4b of the heat-sealed portions 4a, the bag 4 can be positioned and fixed at a correct position relative to the reinforcement members 10.

[0054] In the heat-insulating container according to the embodiment of the present invention, each of the bags 4 is respectively inserted into the gap 3 corresponding to the sidewalls 1a and 2a to form a single heat-insulating layer. However, it is also possible to insert two or more bags 4 by putting one upon another into the gap 3 to form a

plurality of heat-insulating layers. Accordingly, even if the gap is in the same dimension, the heat-insulating performance can be improved due to the laminated structure. Moreover, it is also possible to use one reinforcement member 10 to laminate and fix two or more bags 4.

[0055] Fig. 6 is a perspective view showing the second example of a reinforcement structure (formed with reinforcement members) of the bag 4.

[0056] In this example, the reinforcement member 20 comprises reinforcement plates 21 and 22 that are formed into C-shapes by using base portions 21a, 22a and extending portions 21b, 22b that vertically extend from two ends of the base portions 21a, 22a. The base portions 21a and 22a are connected to each other by a hinge-connection. In this example, the reinforcement member 20 is fixed onto the heat-sealed portions 4a corresponding to three sides of the bag 4.

[0057] In this example, a method for fixing the reinforcement members 20 onto the bag 4 is described as follows.

[0058] After fitting the protrusions 21c of the reinforcement plate 21 into the through holes 4b formed in the heat-sealed portions 4a of the bag 4, the reinforcement member 20 is folded relative to the hinge-connection portion. The reinforcement plates 21, 22 respectively sandwich the heat-sealed portions 4a, such that the reinforcement member 20 is fixed onto the bag 4. When the reinforcement member 20 is folded, the protrusions 21c are fit in the receiving portions 22c formed in the surface of the reinforcement plate 22 opposite to the reinforcement plate 21. Therefore, heat-sealed portions 4aare tightly connected with the reinforcement plates 21 and 22, and the

reinforcement member 20 is fixed onto the bag 4. Moreover, because the protrusions 21c of the reinforcement plate 21 fit in the through holes 4b of the heat-sealed portions 4a, the bag 4 can be positioned and fixed at a correct position relative to the reinforcement member 20. Regarding to other fixing method, the reinforcement plates 21, 22 and the heat-sealed portions 4a can be fixed onto the bag 4 by using an adhesive or a tape.

[0059] In this example, the reinforcement structure is different from that of the first example, such that the reinforcement member 20 is fixed onto the heat-sealed portions 4a (edge portion) corresponding to three sides of the bag 4, and the bag 4 is much easier to be inserted into the gap 3 (up to the depth end of the gap 3). Because the reinforcement member 20 is fixed onto the heat-sealed portions 4a corresponding to the three sides of the bag 4, it is hard to apply excessive force on the bag, so that wrinkling and bending of the bag during insertion of the bag 4 into the gap 3 do not occur.

[0060] Fig. 7 is a perspective view showing the third example of the reinforcement structure (formed with reinforcement members) of the bag 4.

[0061] In this example, the reinforcement member 30 comprises reinforcement plates 31 and 32 formed into C-shapes similar to the reinforcement members 21, 22, wherein a grid portion 32d formed into a grid-shape with roughly the same dimensions in swelling as the gap is formed thereon, and base portions 31a, 32a are hinged-connected with each other. In this example, the reinforcement member 30 is fixed onto the heat-sealed portions 4a corresponding to the three sides of the bag 4.

[0062] Regarding this example, the method of fixing the reinforcement member 30 onto the bag 4 is described as follows.

[0063] After fitting the protrusions 31c formed on the reinforcement plate 31 into the through holes 4b formed in the heat-sealed portions 4a of the bag 4, the reinforcement member 30 is folded relative to the hinge connection portion. The reinforcement plates 31, 32 respectively sandwich the heat-sealed portions 4a, such that the reinforcement member 30 is fixed onto the bag 4. When the reinforcement member 30 is folded, the protrusions 31 are fit in the receiving portions 32c formed in the surface of the reinforcement plate 32 opposite to the reinforcement plate 31. Therefore, heat-sealed portions 4a are tightly connected with the reinforcement plates 31 and 32, and the bag 4 is fixed by the reinforcement member 30. Moreover, because the protrusions 31c of the reinforcement plate 31 fit in the through holes 4b of the heat-sealed portions 4a, the bag 4 can be positioned and fixed at a correct position relative to the reinforcement member 30. The reinforcement plates 31, 32 and the heat-sealed portions 4a are preferably fixed onto the bag 4 by using an adhesive or a tape.

[0064] In this example, the reinforcement structure is different from that of the first example, such that the reinforcement member 30 is fixed onto the heat-sealed portions 4a (edge portion) corresponding to the three sides of the bag 4, and the bag 4 are much easier to be inserted into the gap 3 (up to the depth end of the gap 3). Because the reinforcement member 30 is fixed onto the heat-sealed portions 4a corresponding to the three sides of the bag 4, it is hard to apply excessive force on the bag, so that wrinkling and bending of the bag during the insertion of the bag 4 into the gap 3 do not occur.

[0065] Furthermore, after the bag 4 is filled with a predetermined amount of low heat-conductivity gas, the thickness of the central portion of bag 4 becomes larger than that of the edge portion of the bag 4. In the reinforcement structure of the bag 4 according to this example, by pressing the central portion of the bag 4 by the grid-shaped grid portion 32d of the reinforcement plate 32, the thickness of the bag 4 become roughly uniform. As a result, the bag 4 can be easily inserted into the gap 3, and the partially lowered heat-insulating performance in the gap 3 due to the partially uneven thickness of the bag 4 can be eliminated.

[0066] In the heat-insulating container according to the embodiment of the present invention, the heat-insulating container is a rectangular solid structure. However, the shape of the heat-insulating container is not limited to this particular shape. So long as the bag fixed by the reinforcement member can be inserted into the gap of the heat-insulating container, the heat-insulating container can be formed in any shape, for example, can be a cylindrical shape.

[0067] PRACTICAL EMBODIMENT

The effects of the present invention can be understood with reference to the following practical embodiment referring to Fig. 1.

[0068] A rectangular solid shaped double-walled container is manufactured by using an inner vessel 1 whose thickness is 2.0mm and an outer vessel 2 whose thickness is 2.0mm. The outer dimensions (the dimensions of the outline of the outer vessel 2) of the double-walled container are 380mm Width x 380mm Length x 200mm Height; the dimensions of the outline of the inner vessel 1 are 360mm Width x 360mm Length x

360mm Height. The width of the gap 3 is 10mm, and the volume of the inner vessel 1 is about 23 liter.

[0069] A cap (not shown) made of a synthetic resin in which a 20mm-thickness foaming material is packed is installed on the upper surface (opening portion) of the double-walled container by screws, such that the cap can be opened or closed by using screws.

[0070] The gap 3 is filled with a predetermined amount of low heat-conductivity gas, and the bags 4 fixed by the reinforcement member 10 are inserted into the gap 3 to obtain the heat-insulating container.

[0071] COMPARISON EXAMPLE

A heat-insulating material made of foaming styrene is inserted into the gap 3 of the double-walled container of the comparison example whose double-walled structure is manufactured in the same shape as the practical embodiment to obtain the heat-insulating container of the comparison example.

[0072] The heat-insulating containers of the practical embodiment and the comparison example are filled with hot water of 95°C, and the caps are closed. After the heat-insulating containers are sealed, the two heat-insulating containers are placed in an environment of 35°C.

[0073] After about six hours, the water temperature are checked out, it is found that in the heat-insulating container of the practical embodiment the water temperature is about

87 °C, and the water temperature in the heat-insulating container of the comparison example is about 82 °C.

[0074] As a result, the heat-insulating container of the practical embodiment can be recognized as having a very good heat-insulating performance.

[0075] As described above, in the heat-insulating container of the present invention, because the bags that are filled with a low heat-conductivity gas are fixed by the reinforcement member made of a foaming material, are inserted into the gap of the heat-insulating container, and therefore the bags can be properly inserted into the gap (up to the depth end of the gap). Moreover, during the insertion of the bag into the gap, there is no problem such as applying excessive force on bags, so that wrinkling and bending of the bags, creating pinholes in the bags resulting in leaking the low heat-conductivity gas do not occur.

[0076] Accordingly, a cavity or a protrusion is formed on at least one of the inner vessel 1 and the outer vessel 2, and a protrusion or a cavity that corresponds to the cavity or the protrusion on the inner vessel 1 or the outer vessel 2 is formed on the reinforcement member. By engaging the protrusion at one side with the cavity at the other side, the bag 4 can be fixed by the reinforcement member. When inserting the bags 4 into the gap 3, the bags 4 can be guided by the protrusion or cavity to insert into the gap 3 towards the bottom portion 6 through the opening portion 5 of the heat-insulating container, and to be properly arranged parallel to each other in predetermined positions in the gap 3.

[0077] By arranging the two bags 4 to engage with the reinforcement members at the corner of the gap 3 corresponding to the two adjacent surfaces of the heat-insulating container, the bags 4 can be properly positioned in the gap 3. Additionally, because the reinforcement members are made of the foaming material of a synthetic resin with a low heat-conductivity, the heat-insulating performance at the corner of the gap 3 will not be lowered.

[0078] According to above aspects, the heat-insulating container of the present invention has a heat-insulating effect for a long duration and stable heat-insulating performance without partially deteriorating heat-insulating performance.

[0079] While the present invention has been described with preferred embodiments, this description is not intended to limit the present invention. Various modifications of the embodiment will be apparent to those skilled in the art. It is therefore contemplated that the appended claims will cover any such modifications or embodiments as fall within the true scope of the invention.